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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/015,757 | 12/17/2001 | Hyung-Jun Kim | P67358US0 | 7540 |
| 7590 | 05/05/2004 | | EXAMINER | |
| JACOBSON, PRICE, HOLMAN & STERN PROFESSIONAL LIMITED LIABILITY COMPANY 400 Seventh Street, N.W. Washington, DC 20004 | | | LEWIS, MONICA | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2822 | |

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|--------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/015,757 | KIM, HYUNG-JUN |
| | Examiner Monica Lewis | Art Unit 2822 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 09 February 2004.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,3-8,10,12,13 and 15 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1,3-8,10,12,13 and 15 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 17 December 2001 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1.) Certified copies of the priority documents have been received.
 2.) Certified copies of the priority documents have been received in Application No. _____.
 3.) Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

1. This action is in response to the request for continued examination filed

February 9, 2004.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 3-8, 10, 12, 13 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/9/04 has been entered.

Specification

4. The amendment filed 8/6/03 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "dummy fine line patterns having a sub-micron width" (See Claims 5 and 15).

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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6. Claims 1, 3, 4-8, 10, 12, 13 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the following: a) “being formed by patterning a same layer” (See Claims 1, 5 and 15). Claims 3, 4, 6-8, 10, 12, 13 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 3, 5, 6, 8, 10 and 12-14, as far as understood, are rejected under 35 U.S.C. 103(a) as obvious over Kim et al. (U.S. Patent No. 5,534,728) in view of Kim et al.

Investigation of Aluminum CMP to Apply to Sub-Quarter Micron DRAM Devices.

In regards to claim 1, Kim et al. (“Kim”) discloses the following:

a) a plurality of metal wire patterns which include a fine line pattern and pad patterns (For Example: See Figure 4); and

b) plurality of metal wire patterns being formed by patterning a same layer and being electrically connected to each other (For Example: See Figure 4).

In regards to claim 1, Kim fails to disclose the following:

a) width of less than 1 μ m.

However, Kim et al. (“Kim”) discloses the use of a sub-quarter micron width (For Example: See Page 471 Lines 14 and 15). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include that the width is sub-quarter micron as disclosed in Kim because it aids in preventing corrosion (For Example: See Pages 473-476).

Additionally, since Kim and Kim are both from the same field of endeavor, the purpose disclosed by Kim would have been recognized in the pertinent art of Kim.

b) an area of the fine line pattern being more than 1% of a total area of said plurality of metal wire patterns for preventing corrosion of the fine line pattern from a chemical mechanical polishing process.

Although Kim does not explicitly state that the fine line pattern is more than 1% of a total area of said plurality of metal wire patterns, the Examiner is permitted to give a claim the broadest reasonable interpretation consistent with the specification. See MPEP § 2111. The claim fails to describe a definitive area of the fine line pattern in relation to the overall layout of the metal wire patterns. Additionally, it is true that Kim does not explicitly state that the area of the fine line pattern is more than 1% of a total area of plurality of metal wire patterns, however it is clear that Kim shows a fine line pattern-metal wire pattern orientation in the same manner as claimed. It would have been obvious to one of ordinary skill in the art to allocate the claimed pattern ratio to establish electrical communication between the chip and peripheral components since such technology was well known in the art at the time the invention was made.

Additionally, Kim discloses the use of chemical mechanical polishing and pattern size (For Example: See Page 471-476). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include

the use of chemical mechanical polishing and pattern size as disclosed in Kim because it aids in preventing corrosion (For Example: See Pages 471-476).

Finally, the following limitation makes it a product by process claim: a) "preventing corrosion of the fine line pattern from a chemical mechanical polishing process." The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

In regards to claim 3, Kim discloses the following:

a) the pad patterns include connection pad patterns which electrically connect the pad patterns to the fine line pattern, said connection pad patterns being included in said total area (For Example: See Figure 4).

In regards to claim 5, Kim discloses the following:

a) a plurality of metal wire patterns which include main fine line patterns, main pad patterns and dummy fine line patterns (For Example: See Figure 4); and

b) plurality of metal wire patterns being formed by patterning a same layer and being electrically connected to each other (For Example: See Figure 4).

In regards to claim 5, Kim fails to disclose the following:

a) width of less than $1\mu\text{m}$.

However, Kim discloses the use of a sub-quarter micron width (For Example: See Page 471 Lines 14 and 15). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include that the width is a sub-quarter micron as disclosed in Kim because it aids in preventing corrosion (For Example: See Pages 473-476).

Additionally, since Kim and Kim are both from the same field of endeavor, the purpose disclosed by Kim would have been recognized in the pertinent art of Kim.

b) an area of the dummy fine line patterns, which are connected to the pad patterns, being less than 1% of a total area of said plurality of metal wire patterns and also being less than a value obtained by dividing an area of the main fine line patterns by said total area.

Although Kim does not explicitly state that an area of the dummy fine line patterns, which are connected to the pad patterns are less than 1% of a total area of said plurality of metal wire patterns and less than a value obtained by dividing an area of the main fine line patterns by said total area, the Examiner is permitted to give a claim the broadest reasonable interpretation consistent with the specification. See MPEP § 2111. The claim fails to describe a definitive area of the dummy fine line pattern in relation to the overall layout of the metal wire patterns.

Additionally, it is true that Kim does not explicitly state that an area of the dummy fine line

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patterns, which are connected to the pad patterns are less than 1% of a total area of said plurality of metal wire patterns and less than a value obtained by dividing an area of the main fine line patterns by said total area, however it is clear that Kim shows a dummy fine line pattern-metal wire pattern orientation in the same manner as claimed. It would have been obvious to one of ordinary skill in the art to allocate the claimed pattern ratio to establish electrical communication between the chip and peripheral components since such technology was well known in the art at the time the invention was made.

Additionally, Kim discloses the use of chemical mechanical polishing and pattern size (For Example: See Page 471-476). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include that the use of chemical mechanical polishing and pattern size as disclosed in Kim because it aids in preventing corrosion (For Example: See Pages 471-476).

Finally, since Kim and Kim are both from the same field of endeavor, the purpose disclosed by Kim would have been recognized in the pertinent art of Kim.

In regards to claim 6, Kim discloses the following:

a) the dummy fine line patterns are formed parallel with the main fine line patterns at a distance of a width of the main fine line pattern (For Example: See Figure 4).

In regards to claim 8, Kim discloses the following:

a) the dummy fine line patterns do not form or contribute to any electric circuit (For Example: See Abstract).

In regards to claim 10, Kim discloses the following:

a) the plurality of metal wire patterns further include dummy pad pool patterns, to which the dummy fine line patterns are connected, said dummy pad pool patterns and said dummy fine line patterns being electrically disconnected from the main fine line patterns and the main pad patterns (For Example: See Abstract and Figure 4).

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In regards to claim 12, Kim discloses the following:

a) the plurality of metal wire patterns further include connection pad patterns which electrically connect the main pad patterns to the fine line patterns, said connection pad patterns being included in said total area (For Example: See Abstract and Figure 4).

In regards to claim 13, Kim fails to disclose the following:

a) the total area is represented by $Ap+Ac+A+d$, where, 'd' represents the area of the dummy fine line patterns, 'Ap' represents an area of the main pad patterns, 'Ac' represents an area of the connection pad patterns and 'A' represents the area of the main fine line patterns.

Although Kim does not explicitly state that the total area is represented by $Ap+Ac+A+d$, the Examiner is permitted to give a claim the broadest reasonable interpretation consistent with the specification. See MPEP § 2111. While it is true that Kim does not explicitly state the total area is represented by $Ap+Ac+A+d$, it is clear that Kim shows the following in the same manner as claimed: a) a dummy fine line pattern; b) main pad pattern; c) connection pad pattern; and d) main fine line pattern. It would have been obvious to one of ordinary skill in the art to allocate the claimed area to establish electrical communication between the chip and peripheral components since such technology was well known in the art at the time the invention was made.

In regards to claim 15, Kim discloses the following:

a) a plurality of main metal wire patterns including main fine patterns having main pad patterns, connection pad patterns, which electrically connect the main pad patterns to the fine line patterns (For Example: See Figure 4);

b) a plurality of dummy metal wire patterns including dummy fine line patterns and dummy pad patterns which are electrically connected to each other (For Example: See Figure 4 and Abstract); and

c) plurality of metal wire patterns being formed by patterning a same layer and being electrically connected to each other (For Example: See Figure 4).

In regards to claim 15, Kim fails to disclose the following:

a) width of less than $1\mu m$.

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However, Kim discloses the use of a sub-quarter micron width (For Example: See Page 471 Lines 14 and 15). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include that the width is a sub-quarter micron as disclosed in Kim because it aids in preventing corrosion (For Example: See Pages 473-476).

Additionally, since Kim and Kim are both from the same field of endeavor, the purpose disclosed by Kim would have been recognized in the pertinent art of Kim.

b) an area of said dummy fine line patterns, which are connected to the pad patterns, being formed to be less than 1% of a total area of said plurality of main metal wire patterns according to a formula, $(d/(Ap+Ac+A+d)*100) < 1\%$ and also being less than a value obtained by dividing an area of the main fine line patterns by said total area, which is represented by $Ap+Ac+A+d$, according to a formula, $(d/(Ap+Ac+A+d)) < A/(Ap+Ac+A+d)$ where, 'd' represents the area of the dummy fine patterns, 'Ap' represents an area of the main pad patterns, 'Ac' represents an area of the connection pad patterns and 'A' represents the area of the main fine line patterns.

Although Kim does not explicitly state an area of said dummy fine line patterns, which are connected to the pad patterns, being formed to be less than 1% of a total area of said plurality of main metal wire patterns according to a formula, $(d/(Ap+Ac+A+d)*100) < 1\%$ and also being less than a value obtained by dividing an area of the main fine line patterns by said total area, which is represented by $Ap+Ac+A+d$, according to a formula, $(d/(Ap+Ac+A+d)) < A/(Ap+Ac+A+d)$ where, 'd' represents the area of the dummy fine patterns, 'Ap' represents an area of the main pad patterns, 'Ac' represents an area of the connection pad patterns and 'A' represents the area of the main fine line patterns, the Examiner is permitted to give a claim the broadest reasonable interpretation consistent with the specification. See MPEP § 2111. The claim fails to describe a definitive area of the dummy fine line pattern in relation to the overall layout of the metal wire patterns. Additionally, it is true that Kim does not explicitly

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state that an area of the dummy fine line patterns, which are connected to the pad patterns are less than 1% of a total area of said plurality of metal wire patterns and less than a value obtained by dividing an area of the main fine line patterns by said total area, however it is clear that Kim shows a dummy fine line pattern-metal wire pattern orientation in the same manner as claimed. It would have been obvious to one of ordinary skill in the art to allocate the claimed pattern ratio to establish electrical communication between the chip and peripheral components since such technology was well known in the art at the time the invention was made.

Finally, the Supreme Court has not been clear . . . as to whether such subject matter is excluded from the scope of 101 because it represents laws of nature, natural phenomena, or abstract ideas. See Diehr, 450 U.S. at 186 (viewed mathematical algorithm as a law of nature); Gottschalk v. Benson, 409 U.S. 63, 71-72 (1972) (treated mathematical algorithm as an "idea"). The Supreme Court also has not been clear as to exactly what kind of mathematical subject matter may not be patented. The Supreme Court has used, among others, the terms "mathematical algorithm," "mathematical formula," and "mathematical equation" to describe types of mathematical subject matter not entitled to patent protection standing alone. The Supreme Court has not set forth, however, any consistent or clear explanation of what it intended by such terms or how these terms are related, if at all. Certain mathematical algorithms have been held to be nonstatutory because they represent a mathematical definition of a law of nature or a natural phenomenon. For example, a mathematical algorithm representing the formula $E = mc^2$ is a "law of nature" - it defines a "fundamental scientific truth" (i.e., the relationship between energy and mass). To comprehend how the law of nature relates to any object, one invariably has to perform certain steps (e.g., multiplying a number representing the mass of an

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object by the square of a number representing the speed of light). In such a case, a claimed process which consists solely of the steps that one must follow to solve the mathematical representation of $E = mc^2$ is indistinguishable from the law of nature and would "preempt" the law of nature. A patent cannot be granted on such a process. See MPEP 2106.1

9. Claims 4 and 7, as far as understood, are rejected under 35 U.S.C. 103(a) as obvious over Kim et al. (U.S. Patent No. 5,534,728) in view of Kim et al. *Investigation of Aluminum CMP to Apply to Sub-Quarter Micron DRAM Devices* and Fontana et al. (*Corrosion Engineering*).

In regards to claim 4, Kim fails to disclose the following:

- a) the plurality of metal wire patterns are made of aluminum or copper.

However, Fontana et al. ("Fontana") discloses the use of aluminum (For Example: See Section 5-9). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include the use of aluminum as disclosed in Fontana because it aids in providing resistance to corrosion in many environments (For Example: See Section 5-9).

Additionally, since Kim and Fontana are both from the same field of endeavor, the purpose disclosed by Fontana would have been recognized in the pertinent art of Kim.

In regards to claim 7, Kim fails to disclose the following:

- a) the plurality of metal wire patterns are made of aluminum or copper wire.

However, Fontana discloses the use of aluminum (For Example: See Section 5-9). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kim to include the use of aluminum as disclosed in

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Fontana because it aids in providing resistance to corrosion in many environments (For Example: See Section 5-9).

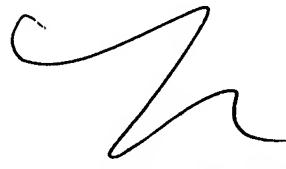
Additionally, since Kim and Fontana are both from the same field of endeavor, the purpose disclosed by Fontana would have been recognized in the pertinent art of Kim.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

April 30, 2004


A handwritten signature in black ink, appearing to read "M. Wilczewski". It is written in a cursive style with a prominent initial 'M' and 'W'.

Mary Wilczewski
Primary Examiner